

Remarks

Claims 1-33 are pending. Claims 1-5, 9, 11-13, 17-21, 25, and 27-29 stand rejected, while claims 6-8, 10, 14-16, 22-24, 26, and 20-33 are objected to. Claim 1 is amended herein. Applicants respectfully traverse the rejection and request allowance of claims 1-33.

Claims 6-8, 10, 14-16, 22-24, 26, and 30-33 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants gratefully acknowledge the indication of allowability.

Claims 1, 3/1, 4, and 6-16 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Inasmuch as the rejection applies to the claims as amended, Applicants respectfully traverse the rejection.

Independent claim 1, as amended, requires determining a current flexural stiffness of said component from a flow meter vibration produced in response to application of a predetermined force to one or more flow tubes of the flow meter. The amendment is fully supported in the specification, such as at page 6, lines 9-13, for example.

In re Bilski recites the current standard for patentability under 35 U.S.C. § 101. In the decision, the Federal Circuit rejected Bilski's claims on the basis of the mental steps doctrine and held that a patent applicant must satisfy 35 U.S.C. § 101 "either by showing that his claim is tied to a particular machine, or by showing that his claim transforms an article." In re Bilski, 545 F.3d 943, 88 USPQ2d 1385 (Fed. Cir. 2008).

At issue therefore is what comprises a transformation of an article in a claim. The Federal Circuit in Bilski elaborated on the transformation test by citing In re Abele, stating that:

[W]e held one of Abele's dependent claims to be drawn to patent-eligible subject matter where it specified that 'said data is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner.' Abele, 684 F.2d at 908-09. This data clearly represented physical and tangible objects, namely the structure of bones, organs, and other body tissues. Thus, the transformation of that raw data into a particular visual

depiction of a physical object on a display was sufficient to render that more narrowly-claimed process patent-eligible.

In re Abele, 684 F.2d 902 (CCPA 1982) at 908-09. The Federal Circuit in Bilski further stated that the data in question in Abele “clearly represented physical and tangible objects” and that “the electronic transformation of the data itself into a visual depiction in Abele was sufficient; the claim was not required to involve any transformation of the underlying physical object that the data represented.”

Applicants herein amend independent claim 1 to satisfy the requirements of 35 U.S.C. § 101 per the decision in Abele. The method transforms a vibrational response of the flow meter into a calibration error condition that indicates a possible calibration error in the flow meter. The calibration error condition can reflect physical flow meter conditions such as erosion, corrosion, coating, changing pipeline mountings, or changing temperature, for example (see page 2, lines 14-18).

Claims 1-5, 9, 11-13, 17-21, 25, and 27-29 stand rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,092,409 to Patten et al in view of the printout from Answers.com (“Answers”). Applicants respectfully traverse the rejection.

Independent claims 1 and 17 require determining a current flexural stiffness of a component of a flowmeter. Claims 1 and 17 further require comparing the initial flexural stiffness to the current flexural stiffness and detecting a calibration error condition responsive to comparing the initial flexural stiffness to the current flexural stiffness.

As can be seen at page 4, lines 11-23 of the present application, the flexural stiffness is not determined from the resonant frequency of the flowmeter, or from any manner of vibrational frequency. Instead, the flexural stiffness is determined from the application of a known force, using a measure of the resulting displacement (see page 6, lines 10-13).

Patten discloses measuring a period of oscillation (T) (see abstract) and using the measured oscillation period to calculate the density of the fluid, using $\rho \approx (1/f)^2$. The calculated density is obtained using a known calibration fluid, wherein the calculated density is compared to a known density of the calibration fluid in order to detect a variation. Patten therefore discloses using the calculated density to detect a possible error

condition in the flowmeter (see abstract) by detecting an anomaly in density measurement. However, Patten **requires** using a calibration fluid of known density in the flowmeter in order to obtain the current measured density (see abstract; see col. 2, lines 51-53; see col. 8, lines 38-66). It is clear from the text of Patten that Patten cannot operate except on a calibration fluid of a known density.

Patten does not quantify or determine a flexural stiffness. Patten does not compare a flexural stiffness. Patten does not teach or suggest that the error might be a flexural stiffness error. Patten never discusses flexural stiffness.

The Office Action concedes that Patten “does not disclose determining/comparing the flexural stiffness of the flowmeter component.” The Office Action therefore provides the Answers document and alleges that Answers couples stiffness to frequency and further alleges that it would have been obvious to combine Patten and the Answers document.

Answers couples an angular vibrational frequency (ω_0) of an undamped system to the mass m and stiffness s . The zero subscript denotes that the equation determines a “natural” or “resonant” frequency as a function of the two given factors. The equation of Answers merely denotes a natural frequency that will depend on the mass and stiffness of a vibrating mechanical system.

While Answers discloses a relationship between resonant frequency and stiffness, there is no teaching or suggestion in Answers as to why a calculation of stiffness would be useful. Neither Patten nor Answers suggests determining stiffness as a way of validating a Flow Calibration Factor. Instead, Patten teaches a FCF validation method using density measurements performed on a calibration fluid.

Neither Patten nor Answers discloses determining flow meter stiffness. The mere recitation of the relationship of stiffness and frequency in a mathematical formula does not comprise a suggestion to use the vibration frequency of Patten to generate a stiffness value. The combination of Patten and Answers does not disclose storing an initial flexural stiffness. Further, the combination of Patten and Answers does not disclose generating a flow meter stiffness value for the purpose of comparing to an initial flexural stiffness.

Independent claims 1 and 17 therefore include features that are neither taught nor suggested by Patten. Dependent claims 2-5, 9, 11-13, 18-21, 25, and 27-29 are allowable for the same reasons as claims 1 and 17.

Applicants respectfully request allowance of claims 1-33. Please feel free to call to discuss the patentability of the pending claims.

Date:

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SIGNATURE OF PRACTITIONER

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